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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

JAN 29 1999

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

MEMORANDUM

SUBJECT: Mole Basis vs. Gram Basis Comparison for t-Butyl Acetate
William L. Johnson
FROM: William L. Johnson, Environmental Engineer
Ozone Policy and Strategies Group
TO: G. T. Helms, Group Leader
Ozone Policy and Strategies Group

Attached is Table I which gives a comparison of ozone yield of t-butyl acetate per mole compared to ozone yield of ethane per mole. This is shown in the second column of the table. For comparison sake, the ozone yield of t-butyl acetate compared to that of ethane on a per gram basis is shown in the first column of the table. The first column is from the document, "Investigation of the Atmospheric Ozone Formation Potential of T-Butyl Acetate" by William P. L. Carter, et al., August 8, 1997, which was submitted by ARCO (Lyondell) Chemical Company as part of their petition to exempt t-butyl acetate as a VOC. The data is taken from Table 4 of that report for the O₃ yield reactivity, model E.

The petition only evaluated the t-butyl acetate reactivity on a per gram basis. On this basis, the ozone yield for t-butyl acetate is less than that for ethane in each of the 39 city scenarios. On a per mole basis, the ozone yield of t-butyl acetate is not less than that for ethane in any of the scenarios. The average ozone yield for t-butyl acetate is 1.47 times that of ethane on a per mole basis.

Attachment

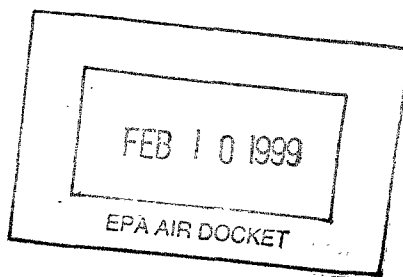


Table I

Ozone Yield per Gram vs. per Mole Comparison
for t-butyl Acetate and Ethane

This table compares ozone yield of t-butyl acetate relative to ethane on a per gram basis and on a per mole basis. The first column expresses grams ozone per gram of t-butyl acetate divided by grams of ozone per gram of ethane. The second column expresses grams of ozone per mole of t-butyl acetate divided by grams ozone per mole of ethane. The numbers in the first column are from Table 4 in "Investigation of the Atmospheric Ozone Formation Potential of T-Butyl Acetate" by William P. L. Carter, et. al. The numbers in the second column were obtained by multiplying the numbers in the first column by 116/30 which is the ratio of the molecular weight of t-butyl acetate to the molecular weight of ethane.

<u>Scenario</u>	t-butyl acetate relative to ethane (<u>gram basis</u>)	t-butyl acetate relative to ethane (<u>mole basis</u>)
Atlanta, GA	0.37	1.43
Austin, TX	0.32	1.28
Baltimore, MD	0.38	1.47
Baton Rouge, LA	0.46	1.78
Birmingham, AL	0.28	1.08
Boston, MA	0.37	1.43
Charlotte, NC	0.28	1.08
Chicago, IL	0.38	1.47
Cincinnati, OH	0.32	1.28
Cleveland, OH	0.40	1.55
Dallas, TX	0.40	1.55
Denver, CO	0.48	1.86
Detroit, MI	0.33	1.28
EL Paso, TX	0.41	1.59
Hartford, CT	0.27	1.04

	t-butyl acetate relative to ethane (<u>gram basis</u>)	t-butyl acetate relative to ethane (<u>mole basis</u>)
Houston, TX	0.38	1.47
Indianapolis, IN	0.36	1.39
Jacksonville, FL	0.40	1.54
Kansas City, MO	0.28	1.08
Lake Charles, LA	0.50	1.93
Los Angeles, CA	0.49	1.89
Louisville, KY	0.36	1.39
Memphis, TN	0.37	1.43
Miami, FL	0.29	1.12
Nashville, TN	0.28	1.08
New York, NY	0.68	2.63
Philadelphia, PA	0.38	1.47
Phoenix, AZ	0.32	1.28
Portland, OR	0.33	1.28
Richmond, VA	0.33	1.28
Sacramento, CA	0.31	1.20
St. Louis, MO	0.40	1.55
Salt Lake City, UT	0.28	1.08
San Antonio, TX	0.36	1.39
San Diego, CA	0.47	1.82
San Francisco, CA	0.51	1.97
Tampa, FL	0.45	1.74
Tulsa, OK	0.40	1.54
Washington, DC	0.36	1.39

	t-butyl acetate relative to ethane <u>(gram basis)</u>	t-butyl acetate relative to ethane <u>(mole basis)</u>
Average	0.38	1.47